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Oilfield Glossary

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Poisson's ratio

1. *n.* [Geophysics]

An elastic constant that is a measure of the compressibility of material perpendicular to applied stress, or the ratio of longitudinal strain. This elastic constant is named for Simeon Poisson (1781 to 1840), a French mathematician. Poisson's ratio can be expressed in terms of properties that can be measured in the field, including velocities of P-waves and S-waves

$$\sigma = \frac{1}{2}(V_P^2 - 2V_S^2)/(V_P^2 - V_S^2),$$

where σ = Poisson's ratio
 V_P = P-wave velocity
 V_S = S-wave velocity.

Note that if $V_S = 0$, then Poisson's ratio equals 1/2, indicating either a fluid, because shear waves do not pass through material that maintains constant volume regardless of stress, also known as an ideal incompressible material. V_S is a characteristic of a gas reservoir. Poisson's ratio for carbonate rocks is ~ 0.3, for sandstones ~0.2, and above 0.3 for coal is ~ 0.4.

See: [elastic constants](#), [P-wave](#), [S-wave](#), [velocity](#)